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**MONITOR WEATHER CONDITIONS FOR CLOUD SEEDING CONTROL**

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Type II Progress Report for Period 1 July 1972 - 31 December 1972

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16. Abstract <b>Progress in this investigation has been retarded by the lack of delivery of the DCS platforms. However, work has continued in firming up the DCS data link between GSFC and the NMC Computer at Suitland, Maryland. Design of interfaces and structures have been completed. Emphasis is being placed on rapid implementation of the DCS platforms and as soon as they become available.</b>			
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Figure 2A. Technical Report Standard Title Page. This page provides the data elements required by DoD Form DD-1473, HEW Form OE-6000 (ERIC), and similar forms.

## Type II Progress Report

### ERTS-A

a. Title: Monitor Weather Conditions for Cloud Seeding Control

ERTS-A Proposal No.: 642

b. GSFC ID No. of P.I.: IN 024

c. The principle problem area at present involves the lack of delivery of the eight data collection platforms and test set required.

A letter dated December 5, 1972 from USGS Mississippi Test Facility indicated shipment as of that date. However, inquiry by this office in early January disclosed that the units had not yet been shipped.

d. Progress during this reporting period has been primarily limited to finalization of planning and contracts with the co-investigating and support groups involved.

Initial planning had disclosed that the analog versions of the DCS platforms would greatly simplify interfacing requirements with available sensors. Through direct communications with the USGS Mississippi Test Facility a sufficient number of analog cards were found to give the eight required platforms analog capability.

Preliminary checks with Goddard Space Flight Center indicated that no real-time data link-up had been planned between GSFC and our computer link with NMC computer at Suitland, Maryland. Since real-time usable data was a key element in this investigation immediate steps were taken to try to establish this real-time link. The best hookup that was available involved the use of a teletype link using punched tape from GSFC. While this is not a very efficient method it appears that our investigative goals can be met with this system.

Western Scientific Services has recently completed and submitted a proposal for the basic DCS implementation task. Portions of their proposal are included below:

"I. SCOPE OF WORK

The purpose of this document is to submit for consideration a proposal for amending Contract No. 14-06-D-6644 for work related to conducting a study under severe environmental conditions of the operational utility of the ERTS Data Collection System (DCS).

"The scope of the work as described herein is the following:

- A. To provide systems engineering related to station configuration, signal conditioning, and interfacing of the meteorological and hydrological sensors to the ERTS DCS equipment.

"B. To construct and perform shop tests of one station, to make engineering design changes as indicated by such tests and to place the initial station in operating mode, and to install the initial station at the Muleshoe meteorological station site.

"C. To construct six additional stations of identical design and physical configuration to the initial station; install additional stations at various sites within the San Juan Mountain area.

"D. To provide technical services for station maintenance and repair during an operational test to be conducted during Spring, 1973.

"E. To submit reports bi-monthly which describe the progress of work, and a final report, due within 60 days following completion of the work, which includes a description of the station design, performance, problems encountered, and the data collected via the ERTS DCS system.

"The period of performance of this work is from November 15, 1972 through June 30, 1973.

## "II. DESCRIPTION OF TASKS

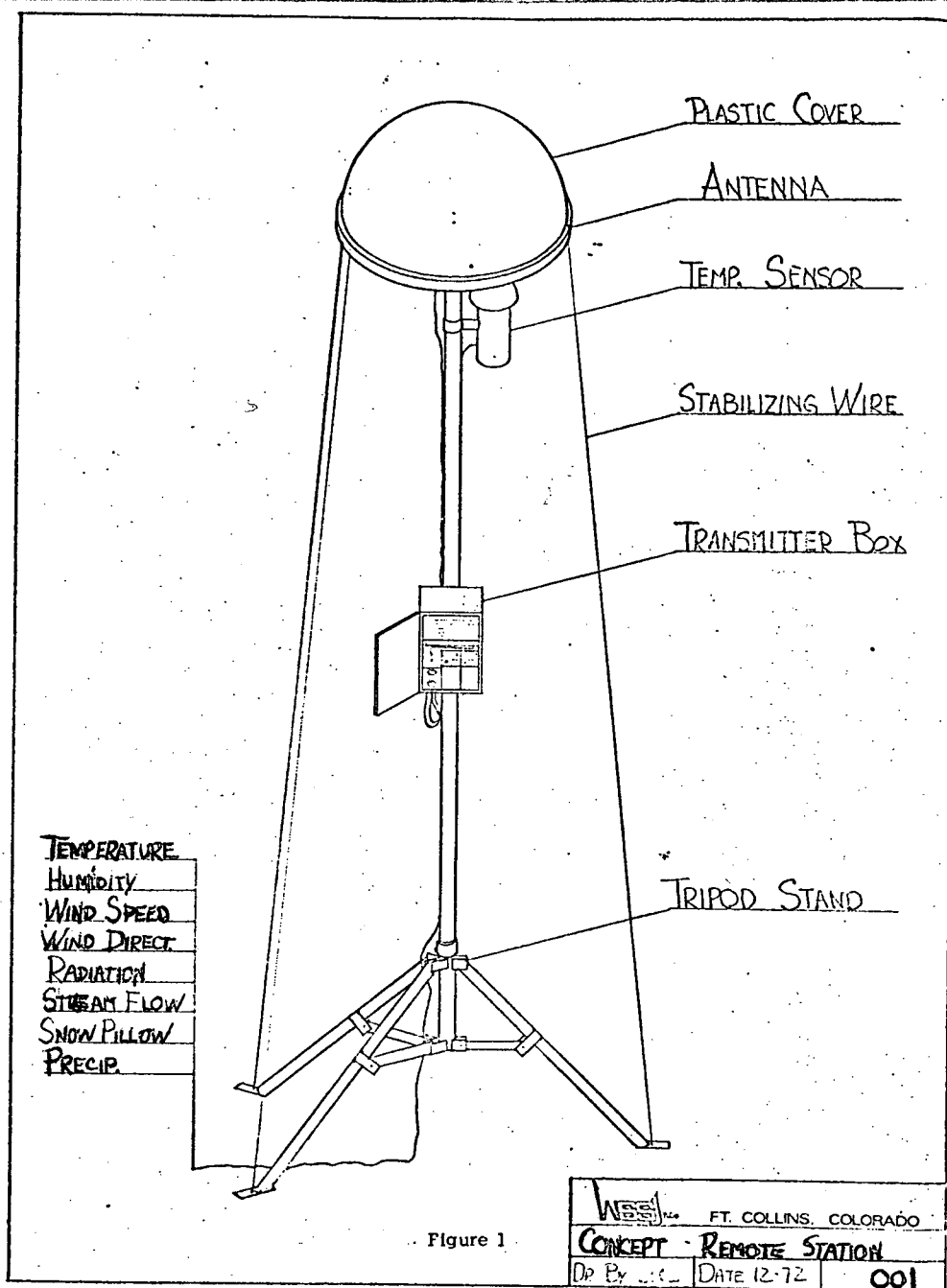
Within the general scope as discussed in Section I, Scope of Work, WSSI shall perform work as described in the following tasks.

### A. Task One - Engineering Design

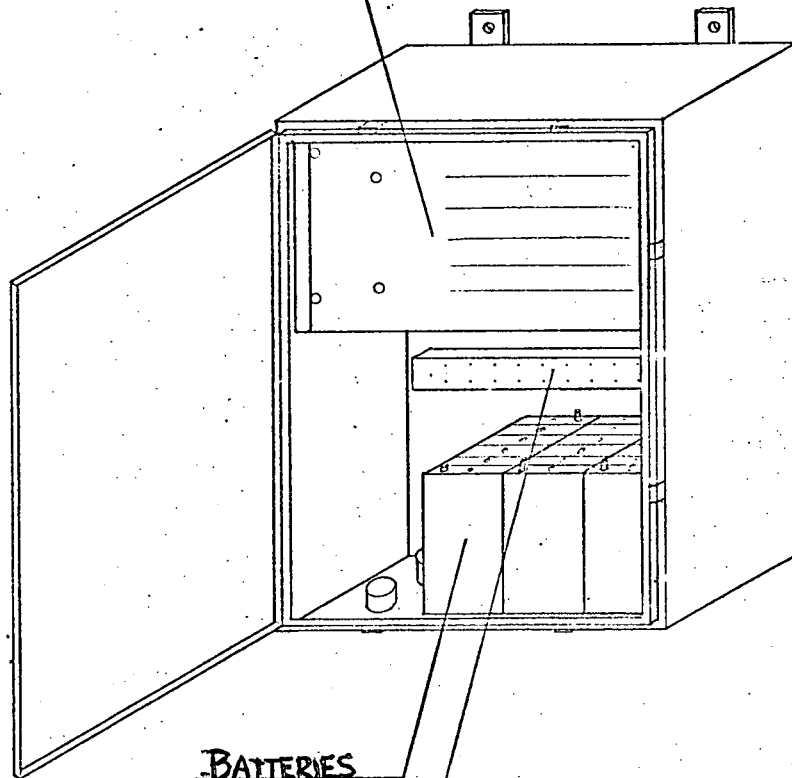
The design of the Data Collection Platform (DCP) consists of defining the physical configuration of the station; design of the electronic package module, and breadboard and testing of electronic circuits prior to fabrication of units to be placed in the field.

All stations will be similar in configuration so that sensors, electronic packages, antenna, etc. can be interchanged at various sites.

"A schematic drawing of the station configuration is as shown in Figure 1 and consists of a tripod mounted, guyed antenna placed 15 feet above ground; the electronic package housed in a weatherproof box for placement beneath the snow surface; a plexiglass antenna dome; and the interconnecting cabling. Temperature and humidity sensors to be furnished with the stations will be placed in self-aspirating temperature shields located below the antenna to minimize effects of solar radiation and snow accumulation.




ERTS - DCP



BATTERIES

SIGNAL CONDITIONING

Figure 2

 FT. COLLINS, COLORADO		
ELECTRONICS PACKAGE		
DATE 12-72	DESIGNED BY P.	DWG. NO. 1000



"A drawing of electronic package module is shown in Figure 2. The components of this package are the ERTS DCS transmitter, an 8-channel signal conditioning unit, and the storage battery power supply. The box housing these components is of water-proof construction, and all components and electrical connections will be coated with moisture-proofing substances. The sensor input cable connectors will be designed to enable interchanging electronic package modules at the various stations without loss of sensor channel identity.

"A breadboard model electronic package shall be constructed and functionally tested prior to fabrication of field units and design changes indicated by the tests effected.

"B. Task Two - Fabrication of Stations

Seven stations are to be constructed as part of this work. The data channel identification for sensor input of each of the stations is shown in Table 1.

"The Muleshoe Mountain DCP will be the first unit to be constructed. Five channels of data will be transmitted: Channel 2, humidity; Channel 3, wind speed; Channel 4, wind direction; and Channel 5, solar radiation. Upon completion of fabrication, the station will be assembled and tested using the field test set with simulated sensor inputs.

Table 1

Channel	Red Mountain	Pallisade	Wolf Creek North	Devil Mountain	Wolf Creek Pass	Lizard Head Pass	Runlett Park
1	Temperature (air) 0 + 5 VDC	Temperature (air) requires sensor 0 + 5 VDC	Temperature (water) requires sensor 0 + 5 VDC	Temperature (air) 0 - 5 VDC	Temperature (air) requires sensor 0 + 5 VDC		Temperature (air) 0 - 5 VDC
2	Humidity requires sensor 0 + 5 VDC			Humidity 0 - 5 VDC	Humidity requires sensor 0 + 5 VDC		Humidity 0 - 5 VDC
3	Wind Speed 0 + 5 VDC			Wind Speed 0 - 5 VDC			Wind Speed 0 - 5 VDC
4	Wind Direction 0 + 5 VDC			Wind Direction 0 - 5 VDC			Wind Direction 0 - 5 VDC
5	Radiation 0 + 100 MVDC						
6		Snow water requires sensor 0 - 5 VDC					
7			Stream Flow requires sensor 0 + 5 VDC				
8				Generator Flame -5 VDC on -0 VDC off	Precipitation requires sensor 0 + 5 VDC	Precipitation requires sensor 0 + 5 VDC	

The results of this test shall be evaluated and indicated design changes effected. On completion of satisfactory shop test, the Muleshoe Mountain DCP shall be installed at the field site and the operational testing phase of the work begun.

"The fabrication of the remaining six stations in Table 1 shall proceed simultaneously after construction and shop testing of the Muleshoe station has been completed. Uniformity of station configuration, electronic packages, and data channel identity shall be maintained. Each station shall be assembled and functionally tested prior to placement at the field sites. The installation of stations will be in pairs of similar stations in the order: Wolf Creek Pass and Lizard Head Pass, Runlett Park and Devil Mountain, and Palisade Lake and Wolf Creek (north of Pagosa Springs).

"C. Task Three - Operational Test

The operational test phase of work consists of collecting data via the ERTS DCS, evaluating station performance and data quality, and performing maintenance of field station and interchanging electronic packages as is necessary.

"Data for evaluating station operational status will be supplied to WSSI via the Bureau of Reclamation computer time-share system. These data, accumulated twice daily by the ERTS DCS, will be obtained and cataloged at WSSI facilities. The data record will be examined weekly as a system functional status. Station maintenance and repair will be initiated as indicated by the data record.

"Evaluation of data quality will be accomplished by comparing data collected by ERTS DCS with coincident on-site recorders and data recorded via the surface telemetry network. Ground truth data will be collected from the various sources as they become available. A preliminary analysis of data quality will be performed on or about April 15, 1973.

"D. Task Four - Manuals and Reports

A manual which documents the design configuration of the station and containing drawings and schematics of the electronic package module shall be prepared by WSSI and submitted to the Bureau of Reclamation by April 15, 1973.

"The following reports will be submitted:

Monthly Progress Report which contains a description of work accomplished and a statement and explanation of problems encountered during the prior month; initial report due February 10, 1973.

"Final Report, to be submitted on or before August 31, 1973, which describes: (1) the history of the work performed, procedures and techniques developed, the operational test of system and results; and (2) the use of the ERTS DCS to application on a severe environment and advantages of the ERTS data collection mode and operational problems and desirable improvements for subsequent experiments.

### "III. SCHEDULE

The schedule for performance of this work, based on a commencement date of January 2, 1973, is as follows:

#### Description of Work Item

Begin project	1/2/73
Engineering design and test prototype circuits	1/2/73 - 1/28/73
Construct and test Muleshoe DCP	1/29/73 - 2/18/73
Design review	2/19/73 - 2/28/73
Install Muleshoe DCP	2/20/73 - 2/28/73
Construct 2nd and 3rd DCP's	2/26/73 - 3/25/73
Construct 4th and 5th DCP's	3/12/73 - 4/8/73
Construct 6th and 7th DCP's	3/26/73 - 4/22/73
Maintenance of DCP stations	3/1/73 - 6/30/73
Report submission	
Monthly	10th day of month following
Final	August 31, 1973

"Changes or modification of this schedule may be caused by problems encountered during the work, late delivery of parts and supplies, or other reasons. If such changes are required, the Bureau of Reclamation representative will be notified as to cause and of the new schedule."

Accomplishments planned for the next reporting period are as follows: The platform design will be completed and a prototype of all circuits evaluated. The Muleshoe station will be fabricated and installed. During this period the computer data link will be established. Mr. Ray T. Telfer will visit GSFC in early January to finalize the GSFC to Suitland data link. Programs will be written to translate data from GSFC into easily usable form on the time-share system. Tests will be run at Fort Collins, Colorado to establish status of total data link before the Muleshoe station is installed.

- e. There have been no significant scientific results to date.
- f. Publications: None
- g. Recommendations: None
- h. Changes in standing order forms: None
- i. Image descriptor forms: n/a
- j. No changes were made in data request forms during the reporting period.